

Comparison Chart of Water Disinfection Methods in a Hospital Environment

Item	Disinfection System							Combination Disinfection Systems		
	Super Heating & Flush	Auto - Chlorinating / Inhibitor System	Auto-Chloramine System (Mono-Chloramine)	Chlorine Dioxide	Copper-Silver Ionization System	Ozoniation	Ultraviolet	Ultraviolet & Auto-Chlorinating / Inhibitor System	Ultraviolet & Auto - Chloramine System (mono-chloramine)	Ultraviolet & Chlorine Dioxide
USED ON DOMESTIC COLD WATER SYSTEM	No	Yes	Yes	Yes	FEASIBLE - RETURN LOOP WITH FIXTURE / EQUIPMENT BACK FLOW PREVENTION REQUIRED	Yes	Yes	Yes	Yes	Yes
USED ON DOMESTIC HOT WATER SYSTEM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CHEMICAL UTILIZED	None	SODIUM HYPOCHLORITE	CHLORAMINE (CHLORINE & AMMONIA)	CHLORINE DIOXIDE (SODIUM CHLORITE)	COPPER & SILVER (MINERALS)	NONE	NONE	SODIUM HYPOCHLORITE	CHLORAMINE (CHLORINE & AMMONIA)	CHLORINE DIOXIDE (SODIUM CHLORITE)
BY-PRODUCT	None	TRIHALOMETHANES (THM'S)	TRIHALOMETHANES (THM'S) (FAR LESS THAN CHLORINE)	SOME CHEMICAL DECOMPOSITION IN FORM OF CHLORITE AND CHLORATE	NONE	BROMATE	OZONE	TRIHALOMETHANES (THM'S)	TRIHALOMETHANES (THM'S) (FAR LESS THAN CHLORINE)	SOME CHEMICAL DECOMPOSITION IN FORM OF CHLORITE AND CHLORATE
EFFECTIVE MAX. pH	None	7.8 pH	9 pH	10 pH	8 pH	NA	NA	7.8 pH	9 pH	10 pH
TASTE & ODORS	None	YES - CAN CAUSE TASTE AND ODOR PROBLEMS	YES - CAN CAUSE TASTE AND ODOR PROBLEMS	NONE (BELOW .8 PPM) - REMOVES MOST TASTE AND ODORS PROBLEMS	NONE	YES - WILL ADD ODOR	NONE - PROVIDED HIGH INTENSITY OZONE LAMPS ARE NOT USED	YES - CAN CAUSE TASTE AND ODOR PROBLEMS / ONLY IF HIGH INTENSITY OZONE LAMPS ARE USED	YES - CAN CAUSE TASTE AND ODOR PROBLEMS / ONLY IF HIGH INTENSITY OZONE LAMPS ARE USED	NONE (BELOW .8 PPM) - REMOVES MOST TASTE AND ODORS PROBLEMS / ONLY IF HIGH INTENSITY OZONE LAMPS ARE USED
IMPACT ON EQUIPMENT AND SYSTEMS	Potential	POTENTIAL CORROSION PROBLEMS	MINIMAL POTENTIAL CORROSION PROBLEMS	MINIMAL POTENTIAL CORROSION PROBLEMS	MINIMAL POTENTIAL DEPOSITION OF COPPER ON MILD STEEL / LOCALIZED CORROSION - NONE REPORTED	POTENTIAL CORROSION PROBLEMS	POTENTIAL - CORROSION PROBLEMS IF HIGH INTENSITY OZONE LAMPS ARE USED	POTENTIAL CORROSION PROBLEMS / ADDITIONAL CORROSION PROBLEMS IF HIGH INTENSITY OZONE LAMPS ARE USED	MINIMAL POTENTIAL CORROSION PROBLEMS / ADDITIONAL CORROSION PROBLEMS IF HIGH INTENSITY OZONE LAMPS ARE USED	MINIMAL POTENTIAL CORROSION PROBLEMS / ADDITIONAL CORROSION PROBLEMS IF HIGH INTENSITY OZONE LAMPS ARE USED
IMPACT ON DIALYSIS EQUIPMENT	None	NONE (BELOW 4 PPM) - CARBON FILTERS AND RO EQUIPMENT EFFECTIVELY REMOVES CHLORINE AND BY-PRODUCTS	SIGNIFICANTLY DIFFICULT TO REMOVE CHLORAMINES (MONO-CHLORAMINES) AND BY-PRODUCTS AT 4 PPM AND BELOW - CARBON FILTERS EFFECTIVE, RO MEMBRANE NOT EFFECTIVE, MEMBRANE DAMAGE	NONE (BELOW .8 PPM) - CARBON FILTERS AND RO EQUIPMENT EFFECTIVELY REMOVES CHLORINE DIOXIDE AND BY-PRODUCTS	INFORMATION CURRENTLY NOT AVAILABLE	INFORMATION CURRENTLY NOT AVAILABLE	NONE	NONE (BELOW 4 PPM) - CARBON FILTERS AND RO EQUIPMENT EFFECTIVELY REMOVES CHLORINE AND BY-PRODUCTS	SIGNIFICANTLY DIFFICULT TO REMOVE CHLORAMINES (MONO-CHLORAMINES) AND BY-PRODUCTS AT 4 PPM AND BELOW - CARBON FILTERS EFFECTIVE, RO MEMBRANE NOT EFFECTIVE, MEMBRANE DAMAGE	NONE (BELOW .8 PPM) - CARBON FILTERS AND RO EQUIPMENT EFFECTIVELY REMOVES CHLORINE DIOXIDE AND BY-PRODUCTS

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ENVIRONMENTAL & HEALTH EFFECTS	WATER IS AT SCALDING TEMPERATURE	PRODUCES CARCINOGENIC THM'S.	PRODUCES CARCINOGENIC THM'S (less than chlorine).	NONE - DOES NOT PRODUCE THM'S AND CAN DESTROY SOME THM'S.	COPPER IS ACUTELY TOXIC TO MANY AQUATIC SPECIES AT LEVELS LOW AS 50 PPB. SYSTEM OPERATES BETWEEN 200 - 600 PPB COPPER, 10 TO 60 PPB SILVER.	NONE - BROMITE IDENTIFIED AS AN ANIMAL CARCINOGEN - EFFECTS ON HUMANS UNKNOWN	NONE	PRODUCES CARCINOGENIC THM'S.	PRODUCES CARCINOGENIC THM'S (less than chlorine).	NONE - DOES NOT PRODUCE THM'S AND CAN DESTROY SOME THM'S.
EPA APPROVED PRIMARY DRINKING WATER DISINFECTANT	No	YES (below 4 ppm)	YES (below 4 ppm)	YES (below .8 ppm)	NO	NO	NO	YES (below 4 ppm)	YES (below 4 ppm)	YES (below .8 ppm)
BREAKS DOWN BIOFILM (AT NOMINAL OPERATING CONDITIONS)	Yes	NO @ BELOW 50 PPM - MINIMAL ABOVE 50 PPM (SYSTEM OPERATES BETWEEN 2 - 3 PPM)	NO - (SYSTEM OPERATES AT 2-3 PPM)	YES	YES / NO - DEPENDING ON PPM	NO	NO	NO @ BELOW 50 PPM - MINIMAL ABOVE 50 PPM (SYSTEM OPERATES BETWEEN 2 - 3 PPM)	NO - (SYSTEM OPERATES AT 2-3 PPM)	YES
INHIBITS BIOFILM (AT NOMINAL OPERATING CONDITIONS)	No	MINIMAL	MINIMAL	YES	YES / NO - DEPENDING ON PPM	NO	NO	MINIMAL	MINIMAL	YES
SHORT TERM RESIDUAL EFFECTIVENESS AGAINST LEGIONELLA (SYSTEM NOT OPERATING)	YES - (APPROX. ONE WEEK)	YES	YES - FAR LESS EFFECTIVE AS CHLORINE	YES	YES	NO	NO	YES	YES - (FAR LESS EFFECTIVE AS CHLORINE)	YES
LONG TERM RESIDUAL EFFECTIVENESS AGAINST LEGIONELLA (SYSTEM NOT OPERATING)	None	NONE	NONE	MINIMAL - SOME RESIDUAL PROTECTION UNTIL BIOFILM IS RE-ESTABLISHED - NONE FOR BULK WATER	YES FOR HOT WATER SYSTEMS ONLY - (LONG TERM STUDIES [4 YEARS] INDICATE LEGIONELLA MAY DEVELOP A TOLERANCE TO SILVER)	NONE	NONE	NONE	NONE	MINIMAL - SOME RESIDUAL PROTECTION UNTIL BIOFILM IS RE-ESTABLISHED NONE FOR BULK WATER
FLUSHING REQUIRED AT ALL FIXTURES AT START UP AND ON PERIODIC BASES	Yes	YES	YES	YES	YES	YES	YES	YES	YES	YES

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CHLORINE SHOCKING OF WATER SYSTEM REQUIRED PRIOR TO SYSTEM OPERATING (SHOCKING EFFECTS BULK WATER ONLY - NO EFFECT ON BIOFILM)	NA	YES	YES	NOT REQUIRED	NOT REQUIRED	YES	YES	YES	YES	NOT REQUIRED
ESTIMATED FOR A 600 GPM SYSTEM (NOT INSTALLED)	NA	\$9,000 (approx.)	\$9,000 (approx.)	\$12,000	\$36,000	NOT AVAILABLE	\$27,000	\$36,000 (approx.)	\$42,000 (approx.)	\$39,000
ESTIMATED INSTALLATION COST	NA	\$5,000 (approx.)	\$5,000 (approx.)	\$3,000	\$5,000	NOT AVAILABLE	\$10,000	\$15,000 (approx.)	\$15,000 (approx.)	\$13,000
ESTIMATED ANNUAL MAINTENANCE COST	\$12,500 (PER EVENT)	\$8,000	\$8,000	\$16,650 @ 1 LB CIO2 OR \$28,250 @ 2 LBS CIO2	\$25,250	NOT AVAILABLE	\$12,600	\$20,600	\$20,600	\$20,000 @ 1 LB CIO2 OR \$32,000 @ 2 LBS CIO2

Prepared by Gregory Bova - JHH Facilities Engineering (Last updated January 30, 2001)